PATENT ABSTRACTS OF JAPAN

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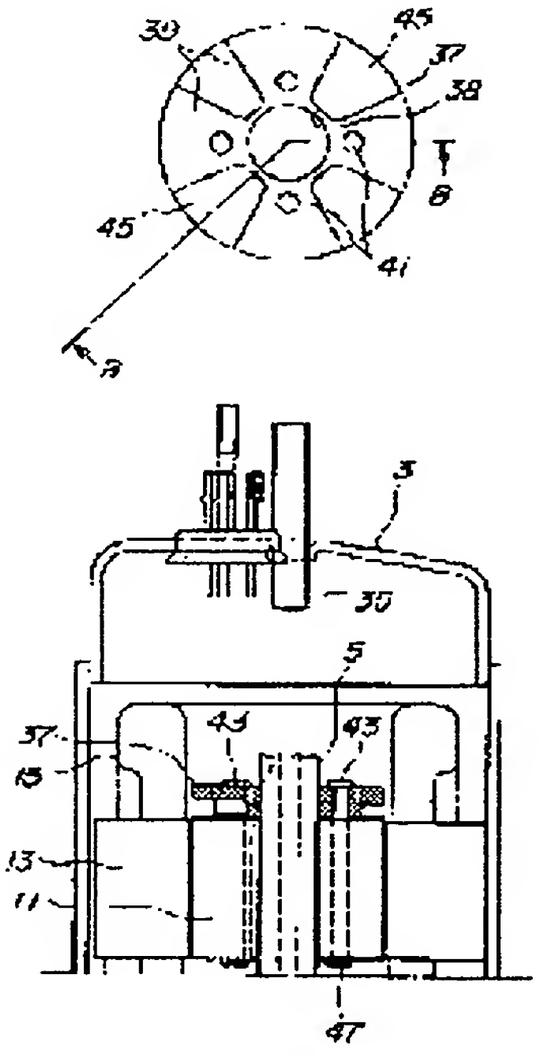
(54) SEALED COMPRESSOR

(57)Abstract:
PROBLEM TO BE SOLVED: To impart a sufficient centrifugal force to a mixture of a lubricating oil with a coolant to satisfactorily separate the coolant from the lubricating oil by making an oil separating plate into a substantially disc form, and forming radial protruding parts and recessed parts on the surface of the disk continuously to the disc circumferential part.
SOLUTION: An oil separating plate 37 has a substantially disc form having four radial protruding parts 39 and recessed parts 45 alternately formed on the lower surface adjacently to each other. The recessed parts 45 are linearly continued to the circumferential part of the disc. A through-hole 38 for piercing the rotating shaft 5 of a rotor core 11 is formed in the center of the disc, and bolt holes 42 are formed in the part of the protruding parts 39 around the through-hole 38 to fix the plate 37 through a bolt 43 and a nut 47. A mixture of a lubricating oil with a coolant is moved in contact with the protruding parts 39 through the recessed parts 45 as passage, and a centrifugal force is imparted thereto. Since the protruding parts 39 are continued to the disc circumferential part, the mixture is blown off from the ends of the protruding parts 39 by a sufficiently large centrifugal force, and collided with a stator 13. Since the distance between the end of the protruding parts 39 and an electric winding 15 is small, the coolant is sufficiently separated from the lubricating oil by a large impact.



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CLAIMS

[Claim(s)]

[Claim 1] The electric element contained inside the well-closed container, and the rotator rotated with an electric element, The compression element which compresses a refrigerant gas and is led to the interior of said well-closed container by the revolution of a rotator, The oil-separation plate which gives a centrifugal force to the mixture of the refrigerant which was prepared in the edge of a rotator, and was rotated and compressed into one, and the oil for lubrication, The stator with which said mixture which constituted said some of electric elements, countered the periphery enclosure of said oil-separation plate, has been arranged, and was flown according to said centrifugal force collides, In the hermetic type compressor which has the discharge tube which collides with a stator, leads an oil and the separated refrigerant, and carries out the regurgitation to the exterior of a well-closed container said oil-separation plate It is the hermetic type compressor which the shape of the approximate circle board is accomplished, and a protruding line and a concave streak are formed in the field of a disc at a radial, and is characterized by the protruding line and the concave streak continuing to the periphery section of a disc.

[Claim 2] The protruding line of said radial is a hermetic type compressor according to claim 1 characterized by being formed in the shape of [which said disc received radially and curved] a wind mill.

[Translation done.]

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the configuration of an oil-separation plate established in order that the compressed refrigerant may dissociate with the oil for lubrication inside the well-closed container of a compressor in detail about a hermetic type compressor.
[0002]
[Description of the Prior Art] For example, a revolving shaft 5 is arranged inside a well-closed container 3 at this alignment, and a well-closed container 3 sets caudad the closed mold rotating type compressor 1 as shown in drawing 4 , and it is supported free [a revolution] with the arm-shaft-horizontal receptacle 7 and the lower-shaft receptacle 9. The rotor core 11 is being fixed above the revolving shaft 7. To this rotor core 11, through a predetermined clearance, it is fixed to the wall of a well-closed container 3, and a stator core 13 is formed in a periphery side. This stator core 13 adjoins up and down, and the motor coil 15 is fixed and is formed.
[0003] Said lower-shaft receptacle 7 and arm-shaft-horizontal receptacle 9 are carrying out discoid with the hole which a revolving shaft 7 penetrates, it is inserted into each of these disc-like bearings 7 and 9, and the cylinders 17 and 19 of the shape of two cylinder are arranged through a diaphragm 21 at this alignment. Eccentricity of the configuration of said revolving shaft 5 in the interior of these cylinders 17 and 19 is carried out to the axial center of a revolving shaft 5, and the cylinder-like roller 23 is arranged at a periphery. If a revolving shaft 5 rotates by this, Rota 23 will carry out an eccentric revolution respectively, performing rotation which rolls in contact with the wall of cylinders 17 and 19.
[0004] Falcation space is formed between Rota 23 and cylinders 17 and 19, in falcation space, by dividing into two, either serves as an inhalatorium and another side serves as [the blade which protruded elastically and which is not illustrated] compression space from cylinders 17 and 19. An eccentric revolution of Rota follows an inhalatorium on progressing, and the space volume increases it. An eccentric revolution follows compression space on progressing, and the space volume decreases. Moreover, inlet port 25 is formed in cylinders 17 and 19, respectively, a suction chamber is attended, and a refrigerant gas is further supplied from the accumulator 29 of the exterior of a well-closed container 3 through a suction pipe 27. Moreover, a delivery 31 is formed in cylinders 17 and 19, respectively, compression space is attended, and it connects with the piping 33 further for regurgitation, and it bypasses, is led to the interior of a well-closed container 3, and is further led outside through a discharge tube 35.
[0005] Thus, as for the conventional hermetic type compressor 1, electric elements (the rotor core 11, a stator core 13, motor coil 15, etc.) and compression elements (cylinders 17 and 19, a roller 23, a blade, an inhalatorium, compression space, etc.) are contained inside a well-closed container 3.
[0006] And by the rotators (a revolving shaft 5, rotor core 11, etc.) rotated with an electric element, a compression element works and a refrigerant gas compresses. Although the compressed refrigerant is led to the interior of a well-closed container 3, it is in the condition of having mixed with the oil used for the lubrication of a compression element. In order to separate both from this mixture, the oil-separation plate 37 is formed in the upper part of a rotator, and it rotates to one. Said mixture to which the revolution **** centrifugal force of the oil-separation plate 37 was given is flown, and collides with the motor coil 15 of a stator (stator). This stator (stator) constitutes said some of electric elements, counters the periphery of the oil-separation plate 37, and is arranged. By the impact equivalent to a stator, it dissociates with a refrigerant and an oil falls to the lower part of a well-closed container 3. An oil and the separated refrigerant are breathed out by the exterior of a well-closed container 3 through a discharge tube 35.
[0007] And the conventional oil-separation plate 37 constitutes the shape of the approximate circle board, as shown in drawing 5 , and the protruding line 39 is formed in the underside of a disc at the radial centering on the hole 38 which a revolving shaft 5 penetrates. A bolthole 41 is formed in the part of a protruding line 39, and immobilization is performed into it to the rotor core 11 of a rotator by the bolt 43 which let this bolthole pass.
[0008]

[Problem(s) to be Solved by the Invention] At this time, many refrigerants flow radially along with a protruding line 39, and the oil for lubrication and the mixture of a refrigerant are flown from the head of a protruding line 39 radial, although a centrifugal force is given along with the oil-separation plate 37. A big distance is between the refrigerants and stators (motor winding 15) which were flown, and sufficient centrifugal force was not given, when a stator was hit, sufficient impact was not acquired, and oil separation were not fully performed.
[0009] This invention was made in order to solve the above trouble, it gives sufficient centrifugal force for the oil for lubrication, and the mixture of a refrigerant, adds a big impact in a stator promptly, and aims at offering the hermetic type compressor which can fully separate a refrigerant and the oil for lubrication.
[0010]
[Means for Solving the Problem] In order to attain the above object, the first invention The electric element contained inside the well-closed container, and the rotator rotated with an electric element, The compression element which compresses a refrigerant gas and is led to the interior of said well-closed container by the revolution of a rotator, The oil-separation plate which gives a centrifugal force to the mixture of the refrigerant which was prepared in the edge of a rotator, and was rotated and compressed into one, and the oil for lubrication, The stator with which said mixture which constituted said some of electric elements, countered the periphery enclosure of said oil-separation plate, has been arranged, and was flown according to said centrifugal force collides, In the hermetic type compressor which has the discharge tube which collides with a stator, leads an oil and the separated refrigerant, and carries out the regurgitation to the exterior of a well-closed container said oil-separation plate The shape of the approximate circle board is accomplished, a protruding line and a concave streak are formed in the field of a disc at a radial, and a protruding line and a concave streak are hermetic type compressors characterized by continuing to the periphery section of a disc.
[0011] The second invention is a hermetic type compressor characterized by forming the protruding line of said radial in the shape of [which said disc received radially and curved] a wind mill further.
[0012]
[Embodiment of the Invention] One operation gestalt of this invention is explained in drawing 1 thru/or drawing 2 . As shown in drawing 1 , the oil-separation plate 37 constitutes the shape of the approximate circle board, and the protruding line 39 and concave streak 45 of a radial make it adjoin each other, and it is formed in an underside alternately [4]. The concave streak 45 is continuing linearly to the periphery section of a disc. The breakthrough 38 which the revolving shaft 5 of a rotator penetrates is formed in the center of a disc, and a total of four boltholes 41 are formed in the part of a protruding line 39 in the perimeter of this breakthrough 38. Immobilization of the oil-separation plate 37 is performed because the bolt 43 which let this bolthole 41 pass penetrates the rotor core 11 and screws in the nut 47 of an opposite hand.
[0013] Hereafter, an operation and effectiveness of this operation gestalt are explained. The oil for lubrication and the mixture of a refrigerant move along the underside of the oil-separation plate 37. At this time, a mixture moves a concave streak 45 as a path. Most mixtures move in the form which touches the protruding line 39 which adjoins this concave streak 45, and a centrifugal force is given. Since the protruding line 39 is continuing to the periphery section of a disc, a long distance will be moved and a centrifugal force big enough is given. Moreover, the mixture flown from the head of a protruding line 39 will collide with a stator promptly. Since the protruding line 39 is continuing to the periphery section of the oil-separation plate 37 compared with the former, it is because the distance of the head of a protruding line 39 and a stator (especially upside motor winding 15) becomes small.
[0014] Thus, the mixture flown according to the big centrifugal force collides with a stator promptly, and gets a big impact. The oil of a refrigerant and a lubricating oil is fully separated by this impact. The separated refrigerant gas passes along the discharge tube 35 formed in the upper part of a well-closed container 3, and is breathed out outside.
[0015] (Other operation gestalten) that in which the protruding line 39 of a radial is linearly formed in the above operation gestalt -- it was (drawing 1) -- in other operation gestalten, it is

also possible to curve and to form a protruding line 39, as shown in drawing 3 . That is, a protruding line 39 is formed in the shape of [which the disc of the oil-separation plate 37 received radially, and curved] a wind mill. Since the flown mixture has the radial velocity compornent of the oil-separation plate 37, and the velocity compornent of a circumferencial direction, it is that there is nothing reasonable to migration ****** with said bow. Therefore, a rate big enough is obtained reasonable and more sufficient oil separation can be expected. In addition, although the case where the number of protruding lines 39 was four was illustrated with the above-mentioned operation gestalt, it is not what was limited to this. The same effectiveness will be acquired if there are 2, 3, 5, two or more 6, etc.

[0016]

[Effect of the Invention] Since the protruding line and concave streak of a radial which were formed in the field of a disc-like oil-separation plate are continuing to the periphery section of a disc according to the first or the second invention as explained above, the mixture of a refrigerant and an oil moves to the periphery section of a disc along with a protruding line, and is flown from the head of a protruding line. For this reason, a centrifugal force big enough joins a mixture, and it is flown at a big speed, and collides with a stator, and an impact big enough is added. Moreover, by making a protruding line continue to the periphery section of a disc, distance between the head of a protruding line and a stator is shortened, and an impact can be enlarged.

[0017] It is carried out reasonable [the migration which is curving from the first according to the force to the centrifugal force which the mixture which moves along with a protruding line since the protruding line of a radial curves further in the second invention and it is formed in the shape of a wind mill commits radially, and a hand of cut], impulse force can be enlarged further, and more sufficient oil separation can be expected.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] (A) is the bottom view of the oil-separation plate concerning 1 operation gestalt of this invention.

(B) is the B-B sectional view of (A).

[Drawing 2] They are some drawings of longitudinal section of the hermetic type compressor equipped with the oil-separation plate of drawing 1 .

[Drawing 3] (A) is the rear view of the oil-separation plate in other operation gestalten.

(B) is the B-B sectional view of (A).

[Drawing 4] It is drawing of longitudinal section showing the conventional hermetic type compressor.

[Drawing 5] The oil-separation plate with which the compressor of drawing 4 was equipped is shown, and (A) is rear view.

(B) is the B-B sectional view of (A).

[Description of Notations]
3 Well-closed Container
5 Revolving Shaft
11 Rotor Core
13 Stator Core
15 Motor Coil
17 19 Cylinder
23 Rota
35 Discharge Tube
37 Oil-Separation Plate
38 Breakthrough
39 Protruding Line
41 Bolthole
45 Concave Streak

[Translation done.]

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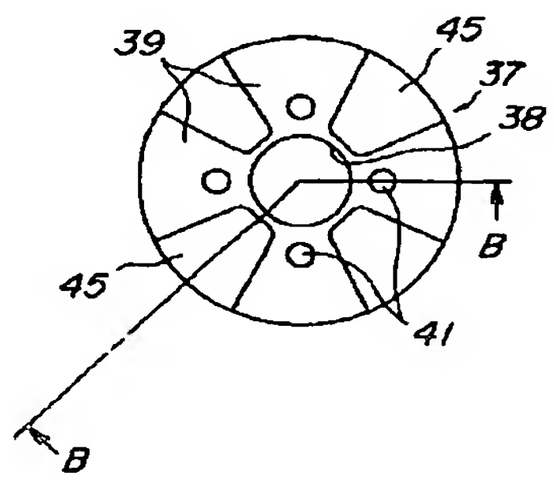
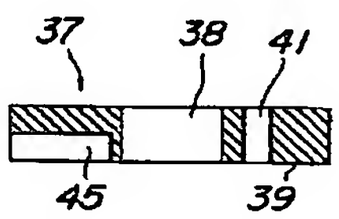
(54)【発明の名称】　密閉型圧縮機

(57)【要約】
【課題】　圧縮された冷媒ガスは、圧縮機の密閉容器の内部に導かれ、潤滑油と分離後に吐出管から密閉容器の外部に吐出される。回転子の端部に設けた油分離板によって、冷媒と潤滑油の混合体に遠心力が与えられ、飛ばされ周囲のステータに衝突し、この衝撃で油と冷媒が分離する。油分離板の形状を工夫して、より十分な油分離の効果を得る。
【解決手段】　略円盤状の油分離板３７の下面に形成する放射状の凸条３９と凹条４５を、円盤の外周部まで連続させる。これにより、混合体は凸条３９に沿って移動し、凸条３９の先端から飛ばされるが、十分に大きな遠心力を得ると共にステータと衝突し大きな衝撃が得られ、十分な油分離が可能となる。

(A)



(B)



【特許請求の範囲】

【請求項１】　密閉容器の内部に収納された電動要素と、電動要素によって回転される回転子と、回転子の回転によって冷媒ガスを圧縮し前記密閉容器の内部に導く圧縮要素と、回転子の端部に設けられて一体に回転し、圧縮された冷媒と潤滑用の油との混合体に遠心力を与える油分離板と、前記電動要素の一部を構成し前記油分離板の外周囲に対向して配置され、前記遠心力によって飛ばされた前記混合体が衝突する固定子と、固定子に衝突して油と分離した冷媒を導き密閉容器の外部に吐出する吐出管と、を有する密閉型圧縮機において、

前記油分離板は、略円盤状を成し、円盤の面に放射状に凸条と凹条が形成され、凸条と凹条は円盤の外周部まで連続していることを特徴とする密閉型圧縮機。

【請求項２】　前記放射状の凸条は、前記円盤の半径方向に対し湾曲した風車状に形成されたことを特徴とする請求項１記載の密閉型圧縮機。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】この発明は、密閉型圧縮機に関し、詳しくは、圧縮された冷媒が圧縮機の密閉容器の内部で潤滑用の油と分離するために設けられる油分離板の形状に関する。

【０００２】

【従来の技術】例えば図４に示すような密閉型回転式圧縮機１は、密閉容器３の内部に同心に回転軸５が配置され、密閉容器３の下方において上軸受け７と下軸受け９によって回転自在に支えられる。回転軸７の上方には、ロータコア１１が固定されている。このロータコア１１に対し所定の隙間を介して、外周側にステータコア１３が密閉容器３の内壁に固定されて設けられる。このステータコア１３の上下に隣接して電動機巻線１５が固定して設けられる。

【０００３】前記下軸受け７と上軸受け９は回転軸７が貫通する孔を有した円盤状をしており、この円盤状の各軸受け７、９に挟まれて、２つの円筒状のシリンダ１７、１９が、仕切り板２１を介して同心に配置される。このシリンダ１７、１９の内部における前記回転軸５の形状は、回転軸５の軸心に対し偏心し、外周に円筒状のローラ２３が配置される。これにより回転軸５が回転すると、ロータ２３は、シリンダ１７、１９の内壁に接して転がる自転を行いながら、おのおの偏心回転する。

【０００４】ロータ２３とシリンダ１７、１９との間には三日月状の空間が形成され、シリンダ１７、１９から弾性的に突設された図示しないベーンが、三日月状の空間を２つに分け、いずれかが吸入室、他方が圧縮室となる。吸入室は、ロータの偏心回転が進むに伴い空間体積が増加する。圧縮室は、偏心回転が進むに伴い空間体積が減少する。また、シリンダ１７、１９にはそれぞれ吸込口２５が形成されて吸込室に臨み、さらに吸込管２７

を介して密閉容器３の外部のアキュームレータ２９から冷媒ガスが供給される。また、シリンダ１７、１９にはそれぞれ吐出口３１が形成されて圧縮室に臨み、さらに吐出用の配管３３に接続され、迂回して密閉容器３の内部へ導かれ、さらに吐出管３５を介して外部に導かれる。

【０００５】このように従来の密閉型圧縮機１は、密閉容器３の内部に電動要素（ロータコア１１、ステータコア１３、電動機巻線１５など）と圧縮要素（シリンダ１７、１９、ローラ２３、ベーン、吸入室、圧縮室など）が収納される。

【０００６】そして電動要素によって回転される回転子（回転軸５、ロータコア１１など）によって圧縮要素が働き、冷媒ガスが圧縮する。圧縮された冷媒は密閉容器３の内部に導かれるが、圧縮要素の潤滑に用いられる油と混合した状態にある。この混合体から両者を分離するため、回転子の上部には油分離板３７が設けられ、一体に回転する。油分離板３７の回転よる遠心力が与えられた前記混合体は、飛ばされて固定子（ステータ）の電動機巻線１５に衝突する。この固定子（ステータ）は前記電動要素の一部を構成するものであり、油分離板３７の外周に対向して配置される。ステータに当たった衝撃により油は冷媒と分離して密閉容器３の下部に落ちる。油と分離した冷媒は吐出管３５を通って密閉容器３の外部に吐出される。

【０００７】そして、従来の油分離板３７は、図５に示すように略円盤状を成し、回転軸５が貫通する孔３８を中心にして、円盤の下面に放射状に凸条３９が形成されている。凸条３９の部分には、ボルト孔４１が形成され、このボルト孔を通したボルト４３により回転子のロータコア１１に対し固定が行われる。

【０００８】

【発明が解決しようとする課題】潤滑用の油と冷媒の混合体は、油分離板３７に沿って遠心力が与えられるが、このとき多くの冷媒が凸条３９に沿って半径方向に流れ、凸条３９の先端から半径方向へ飛ばされる。飛ばされた冷媒とステータ（電動機巻き線１５）との間には大きな距離があり、また十分な遠心力が与えられず、ステータに当たった際に十分な衝撃が得られず、油分離が十分に行われなかった。

【０００９】この発明は、以上の問題点を解決するためになされたもので、潤滑用の油と冷媒の混合体に十分な遠心力を与え、直ちにステータに当たって大きな衝撃を加え、冷媒と潤滑用の油を十分に分離できる密閉型圧縮機を提供することを目的とする。

【００１０】

【課題を解決するための手段】以上の目的を達成するために、第一の発明は、密閉容器の内部に収納された電動要素と、電動要素によって回転される回転子と、回転子の回転によって冷媒ガスを圧縮し前記密閉容器の内部に

導く圧縮要素と、回転子の端部に設けられて一体に回転し、圧縮された冷媒と潤滑用の油との混合体に遠心力を与える油分離板と、前記電動要素の一部を構成し前記油分離板の外周囲に対向して配置され、前記遠心力によって飛ばされた前記混合体が衝突する固定子と、固定子に衝突して油と分離した冷媒を導き密閉容器の外部に吐出する吐出管と、を有する密閉型圧縮機において、前記油分離板は、略円盤状を成し、円盤の面に放射状に凸条と凹条が形成され、凸条と凹条は円盤の外周部まで連続していることを特徴とする密閉型圧縮機である。

【００１１】第二の発明は、さらに、前記放射状の凸条は、前記円盤の半径方向に対し湾曲した風車状に形成されたことを特徴とする密閉型圧縮機である。

【００１２】

【発明の実施の形態】この発明の一実施形態を図１乃至図２において説明する。図１に示すように油分離板３７は略円盤状を成し、下面に、放射状の凸条３９と凹条４５が隣り合わせて４本交互に形成される。凹条４５は、円盤の外周部まで直線的に連続している。円盤の中央には回転子の回転軸５が貫通する貫通孔３８が形成され、この貫通孔３８の周囲において凸条３９の部分に合計４か所のボルト孔４１が形成される。このボルト孔４１を通したボルト４３がロータコア１１を貫通し反対側のナット４７に螺合することで、油分離板３７の固定が行われる。

【００１３】以下、この実施形態の作用・効果を説明する。潤滑用の油と冷媒の混合体は、例えば油分離板３７の下面に沿って移動する。このとき混合体は、凹条４５を通路として移動する。大部分の混合体は、この凹条４５に隣接する凸条３９に接する形で移動し、遠心力が与えられる。凸条３９は円盤の外周部まで連続しているため、長い距離を移動することとなり、十分に大きな遠心力が与えられる。また、凸条３９の先端から飛ばされた混合体は、直ちにステータに衝突することとなる。従来に比べ、凸条３９が油分離板３７の外周部まで連続しているため、凸条３９の先端とステータ（特に、上部の電動機巻き線１５）との距離が小さくなるためである。

【００１４】このようにして大きな遠心力により飛ばされた混合体は、直ちにステータに衝突し、大きな衝撃を受ける。この衝撃により、冷媒と潤滑油の油は十分に分離される。分離した冷媒ガスは密閉容器３の上部に設けられた吐出管３５を通り、外部に吐出される。

【００１５】（他の実施形態）以上の実施形態においては、放射状の凸条３９は直線的に設けられるものであった（図１）が、他の実施形態においては、図３に示すように凸条３９を湾曲して形成することも可能である。すなわち、凸条３９を油分離板３７の円盤の半径方向に対し湾曲した風車状に形成する。飛ばされた混合体は、油分離板３７の半径方向の速度成分と円周方向の速度成分を有するので、前記湾曲により無理なく移動すことにな

る。したがって、十分に大きな速度を無理なく得られ、より十分な油分離を期待できる。なお、上述の実施形態では凸条３９が４本の場合を例示したが、これに限定したものではない。２本、３本、５本、６本など複数本あれば同様の効果が得られる。

【００１６】

【発明の効果】以上説明したように、第一又は第二の発明によれば、円盤状の油分離板の面に形成された放射状の凸条と凹条は、円盤の外周部まで連続しているため、冷媒と油との混合体は凸条に沿って円盤の外周部まで移動し、凸条の先端から飛ばされる。このため混合体には十分に大きな遠心力が加わり、大きなスピードで飛ばされてステータに衝突し、十分に大きな衝撃が加えられる。また凸条を円盤の外周部まで連続させることで、凸条の先端とステータとの間の距離を短くし、衝撃を大きくできる。

【００１７】第二の発明では、更に、放射状の凸条が湾曲し風車状に形成されているので、凸条に沿って移動する混合体は、半径方向に働く遠心力と回転方向への力によってもともと湾曲している移動が、無理無く行われ、更に衝撃力を大きくでき、より十分な油分離が期待できる。

【図面の簡単な説明】

【図１】（Ａ）は、この発明の一実施形態に係る油分離板の底面図

（Ｂ）は、（Ａ）のＢ－Ｂ断面図である。

【図２】図１の油分離板を備えた密閉型圧縮機の一部の縦断面図である。

【図３】（Ａ）は、他の実施形態における油分離板の背面図

（Ｂ）は、（Ａ）のＢ－Ｂ断面図である。

【図４】従来の密閉型圧縮機を示す縦断面図である。

【図５】図４の圧縮機に備えられた油分離板を示し

（Ａ）は背面図

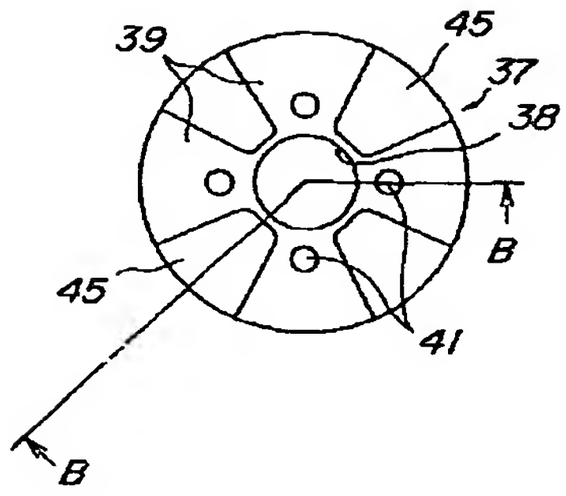
（Ｂ）は（Ａ）のＢ－Ｂ断面図である。

【符号の説明】

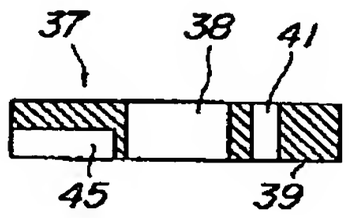
３　密閉容器
５　回転軸
１１　ロータコア
１３　ステータコア
１５　電動機巻線
１７、１９　シリンダ
２３　ロータ
３５　吐出管
３７　油分離板
３８　貫通孔
３９　凸条
４１　ボルト孔
４５　凹条

【図１】

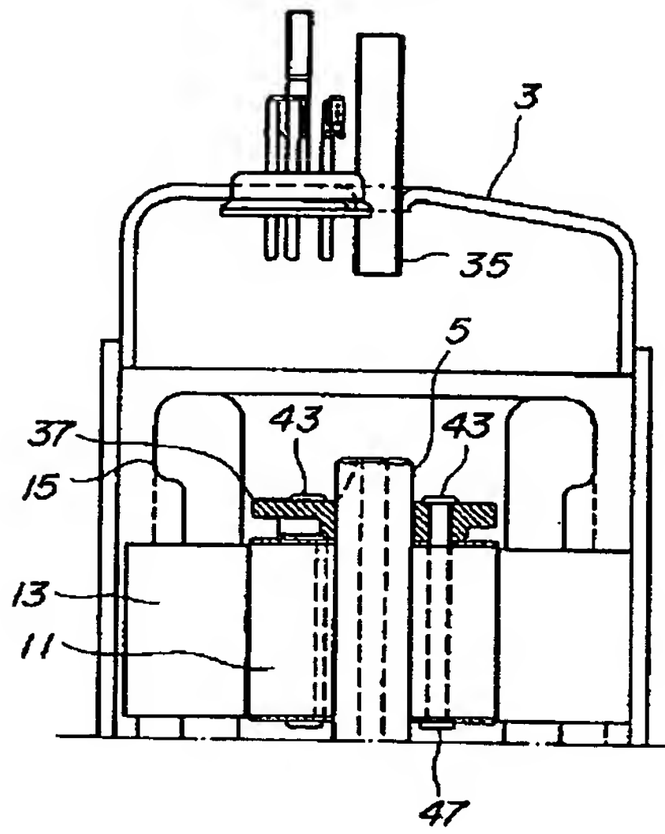
(A)



(B)

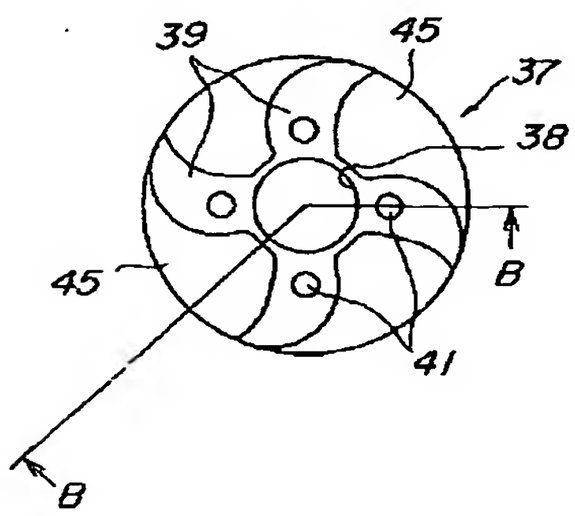


【図２】

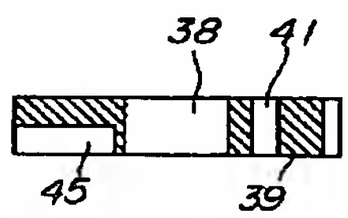


【図３】

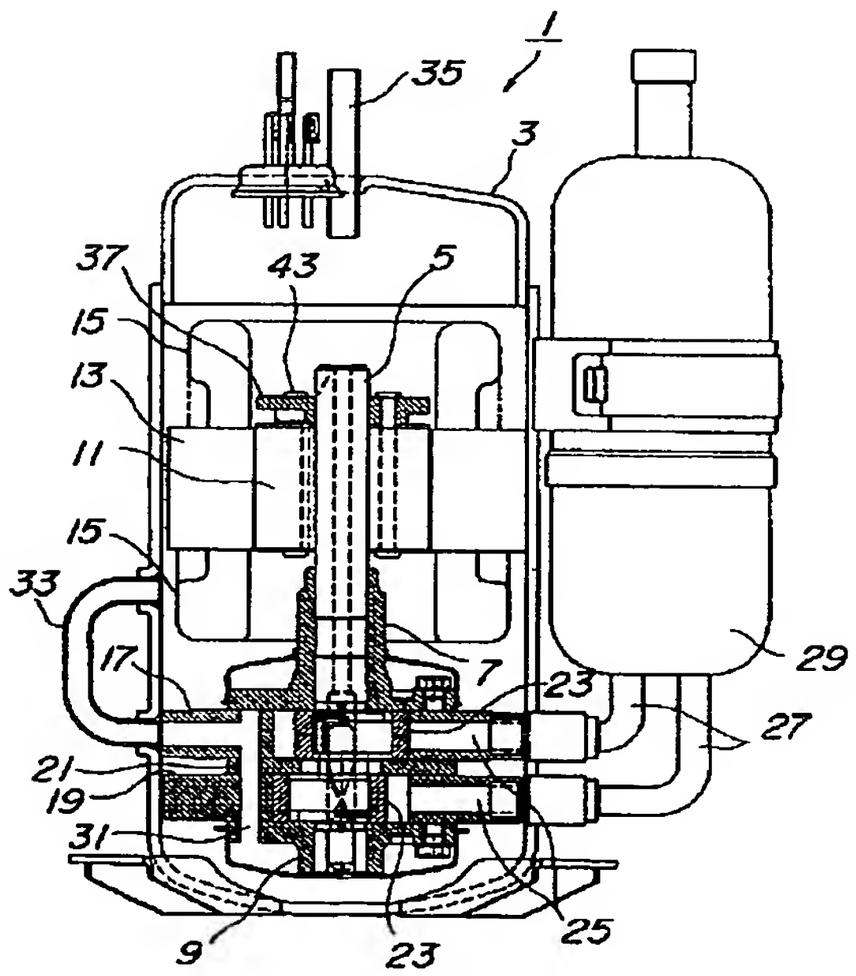
(A)



(B)

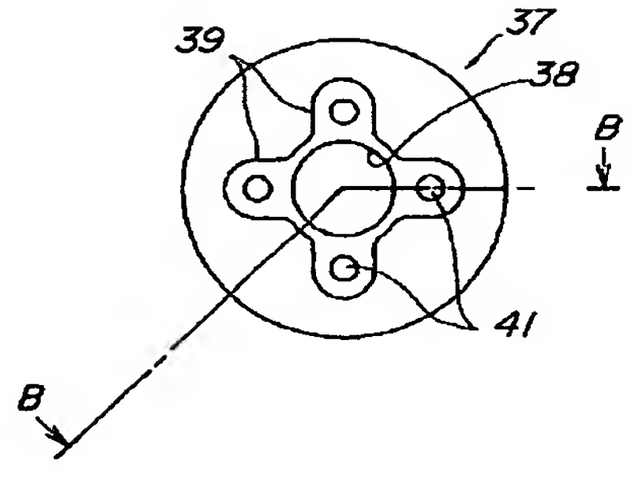


【図４】



【図５】

(A)



(B)